



The Office of Environment, Safety and Health conducted a safety management evaluation at SNL.

The U.S. Department of Energy (DOE) Office of Environment, Safety and Health (EH) conducted an independent oversight evaluation of safety management at Sandia National Laboratories (SNL) at their New Mexico site from June to August 1997. The purpose of the evaluation was to determine how effectively DOE and contractor line management have implemented an integrated safety management system (ISMS) and environment, safety, and health (ES&H) programs at SNL.

Established in 1949, SNL's original mission was the design of the non-nuclear

components of the nation's nuclear weapons. Nuclear weapons research, development, and stockpile stewardship remain an important part of the current SNL mission. SNL also performs basic and applied research in defense, energy, and environmental science. In recent years, SNL has emphasized partnerships with universities and industry and the commercialization of technology.



SNL is a multi-program research laboratory that receives direction from many DOE program offices.

As one of several DOE multi-program laboratories, SNL receives programmatic

TERMINOLOGY

Safety management refers to those systems required to ensure that an acceptable level of protection of the public, workers, and environment is maintained throughout the life of a facility or operation. The term "safety," when used in the context of safety management or the safety management program, specifically includes all aspects of environment, safety, and health.

Line management refers to the chain of command that extends from the Secretary of Energy through the Deputy Secretary or Under Secretary to the cognizant secretarial officers, DOE operations office managers, and contractors. Line management consists of DOE and contractor personnel organizationally or contractually responsible for work or job tasks (see Figures 1 and 2).

Integrated safety management system refers to a comprehensive and coordinated program of ES&H expectations and activities. DOE's recently issued policy, DOE Policy 450.4, *Safety Management System*, defines six components of an integrated safety management program. These are: 1) the objective, 2) guiding principles, 3) core functions, 4) mechanisms, 5), responsibilities, and 6) implementation. These components (see Figure 3) provide the framework for the Office of Oversight's evaluation of the SNL safety management program.



Non-nuclear components of a nuclear weapon

direction and funding from several DOE program offices, including the Offices of Defense Programs (DP), Nuclear Energy, Science and Technology (NE), Environmental Management (EM), Energy Research, and Energy Efficiency and Renewable Energy. SNL also performs work for other U.S. government agencies, other countries, and industry under a variety of cost-reimbursement arrangements. SNL receives operational direction from DOE's Albuquerque Operations Office (AL) and the Kirtland Area Office (KAO), which is the AL office that has primary operational responsibility for SNL.

Figure 1 shows a simplified view of the DOE and contractor organizations that have key roles in managing activities at SNL. Figure 2 shows simplified versions of the AL, KAO, and SNL organizational structures.

Scope

This safety management evaluation of SNL focuses on the effectiveness of DOE Headquarters program offices, AL, KAO, Sandia Corporation, and selected SNL subcontractors in implementing the objectives, principles, and core functions of an integrated safety management system. The evaluation focused on SNL facilities in Albuquerque, New Mexico; SNL also has a site in Livermore, California, that was not reviewed during this evaluation.



The evaluation addresses safety management system effectiveness from the Headquarters level to the worker.

As shown in Figure 1, the integrated safety management evaluation is a “top to bottom” review of ES&H management; it encompasses the organizations responsible for SNL from the program office to the DOE operations office, to the managing and operating contractor, to subcontractors, and ultimately to the workers at selected facilities. The evaluation also samples the effectiveness of ES&H programs from the identification of applicable policies to their implementation by the worker on the “shop floor.”

The basis for this evaluation is a template that characterizes the principles, programs, and disciplines that are essential elements of a sound safety management program. This conceptual framework centers around the objectives, principles, and functions for integrated safety management systems described in DOE Policy 450.4, *Safety Management System*. Figure 3 shows these components.



The fundamental premise is that line management is responsible and accountable for ES&H programs.

This approach is based on the fundamental premise that line managers are responsible and accountable for managing ES&H through proper work planning, hazard analyses, hazard control, and ongoing self-assessments of the efficacy of implemented controls. This template can accommodate the wide range of operations, hazards, and management styles at DOE facilities.

The components of the integrated safety management program, as defined in the January 1996 DOE policy, are essential elements of any ES&H program, and each DOE site should currently have most of the elements in place. The Office of Oversight recognizes that SNL, as well as other DOE facilities, is in the very early stages of formally integrating the components into a system such as envisioned in the new policy, and that full

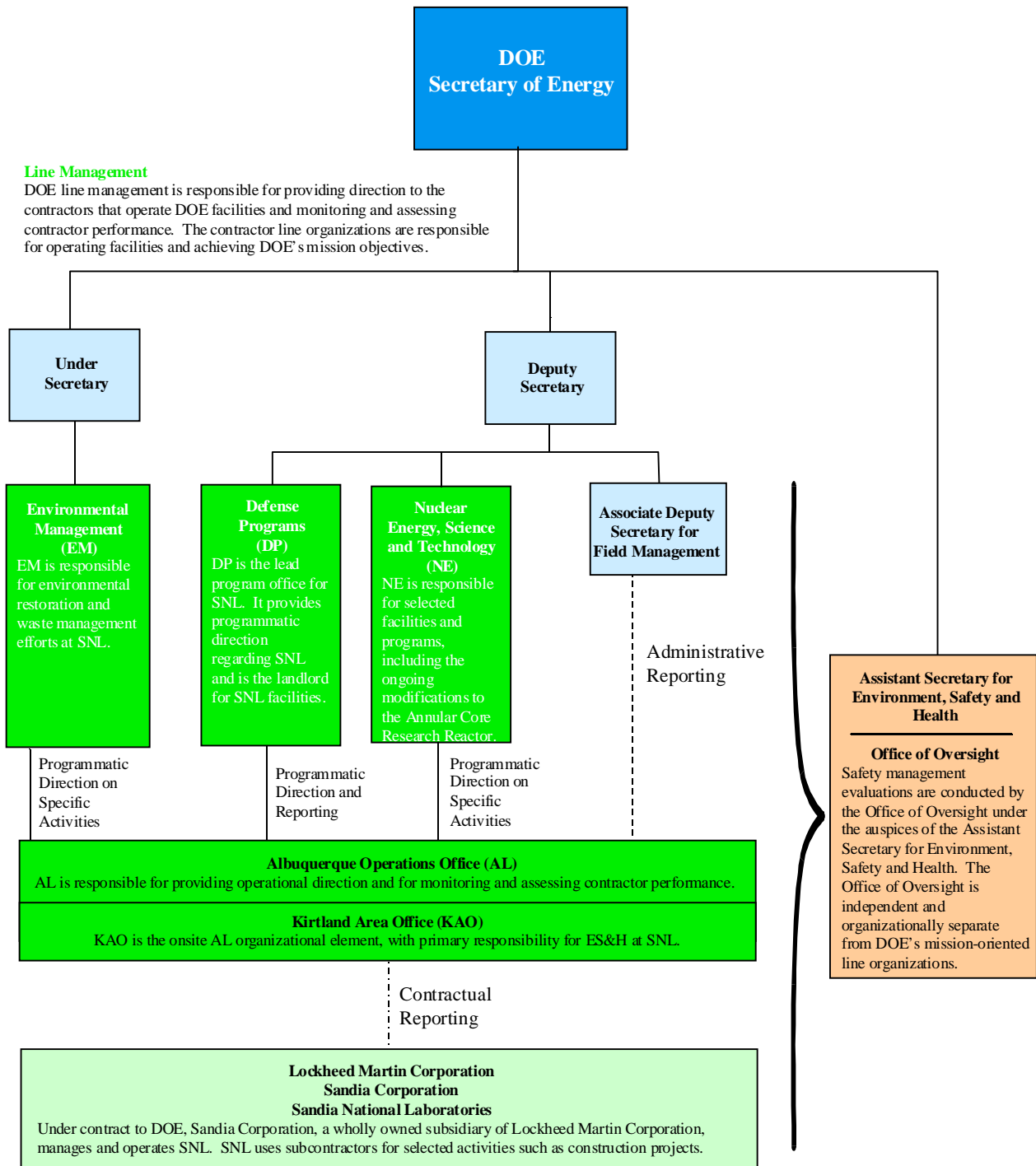


Figure 1. Organizations with Responsibilities at Sandia National Laboratories

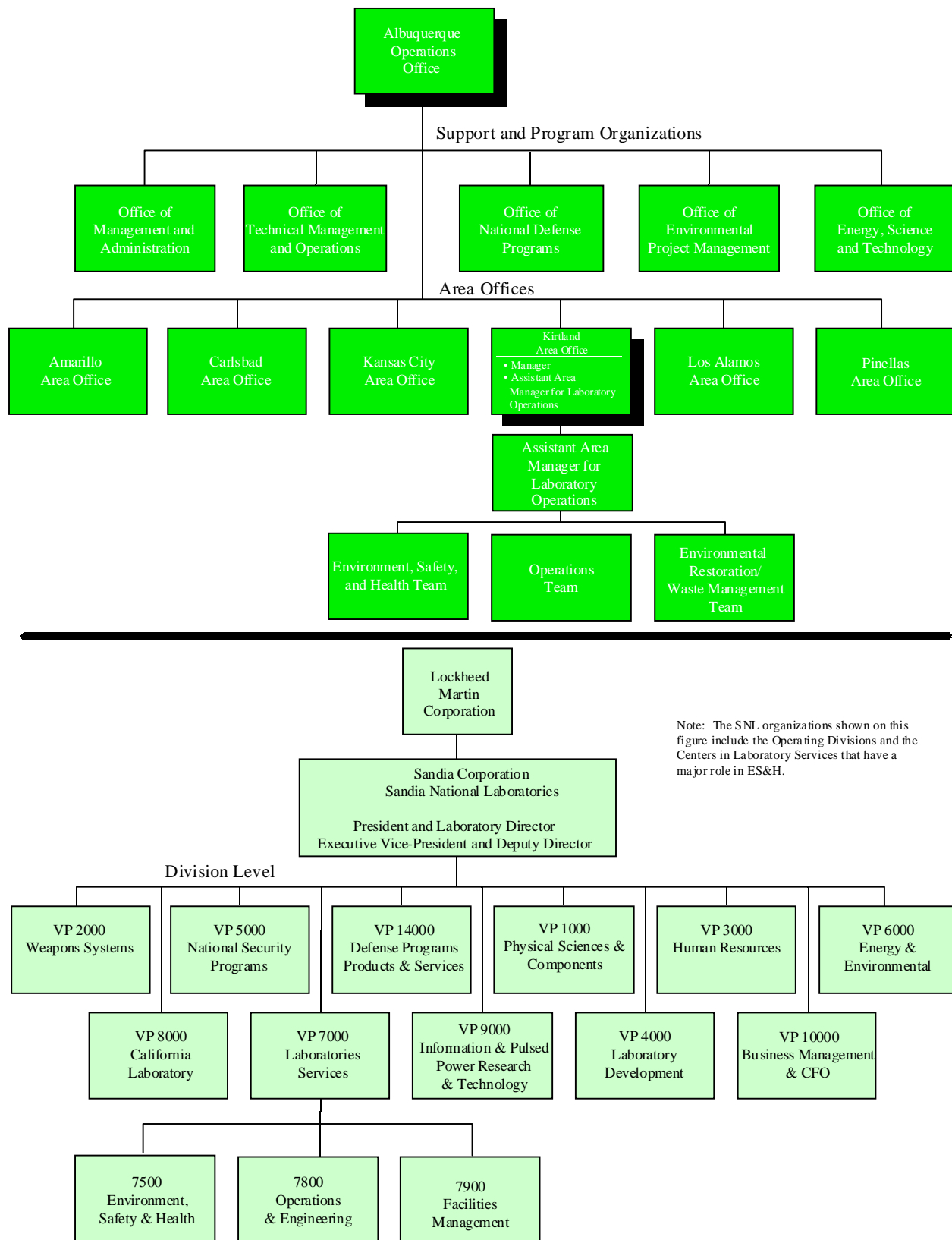


Figure 2. Albuquerque Operations Office, Kirtland Area Office, and Sandia National Laboratories Organizations

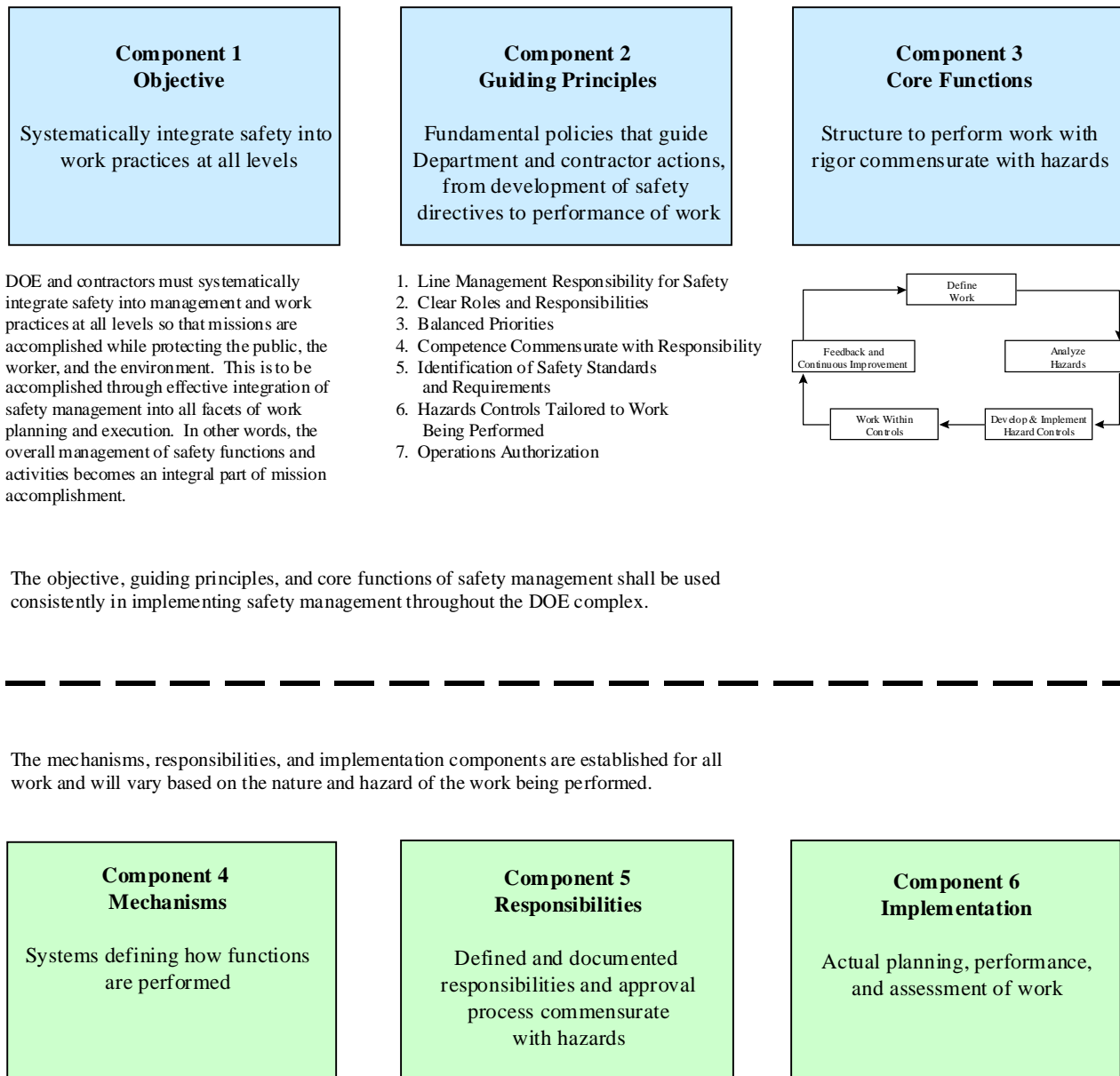


Figure 3. Components of DOE’s Integrated Safety Management System

integration will take some time. Key elements of integrated safety management, including the guiding principles and core functions, were examined to evaluate which elements are functioning effectively and to identify which areas need improvement and management attention.



The evaluation focused on selected facilities and programs.

A selected sample of SNL facilities was evaluated to understand how the guiding principles and core functions of safety management are actually implemented: the Annular Core Research Reactor, the Hot Cell Facility, the Gamma Irradiation Facility, the Neutron Generator Facility, the Microelectronics Development Laboratory, and the Radioactive and Mixed Waste Management Facility. The safety management evaluation examined selected ES&H programs, such as conduct of operations, construction safety, configuration management, occupational radiological protection, industrial safety/hygiene, maintenance, electrical safety, and environmental radiological protection. These facilities and ES&H programs were selected to provide a broad perspective of the safety management program at SNL.

The Office of Oversight team selected several areas for additional emphasis: work planning and control; issues management; assessments and corrective actions; hazards analysis and authorization basis; control of subcontractor safety performance; and employee involvement in safety and health. These focus areas were selected based on an extensive Oversight planning effort that included analysis of SNL occurrence reports, interviews of management and staff, and review of a number of previous assessments at SNL.

This Oversight evaluation report is organized to provide perspectives on seven major elements of a safety management system:

1. Policy, Leadership, and Worker Empowerment
2. Clear Roles, Responsibilities, and Accountability

3. Balanced Priorities
4. Competence Commensurate with Responsibility
5. Identification of Standards and Requirements
6. Hazard Analysis, Work Planning, Hazard Controls, and Operations Authorization
7. Performance Evaluation and Feedback



The seven evaluated elements closely correspond to the seven guiding principles of safety management.

The seven evaluated elements closely correspond to the seven guiding principles but have been modified to provide a more effective independent evaluation of the safety management program. Most notably, two closely related principles (Hazards Controls Tailored to Work Being Performed and Operations Authorization) are combined into one discussion for reporting and evaluation purposes, and an important element of the core functions—Performance Evaluation and Feedback—is discussed as a separate element because of its importance to the safety management program.

The seven elements discussed in this report fall into two general categories. The first category encompasses the first three elements (Policy, Leadership, and Worker Empowerment; Clear Roles, Responsibilities, and Accountability; and Balanced Priorities), which correspond to management responsibilities. The second category encompasses the last three elements (Identification of Standards and Requirements; Hazard Analysis, Work Planning, Hazard Control, and Operations Authorization; and Performance Evaluation and Feedback), which correspond to management's implementation of a safety management program. The fourth element (Competence Commensurate With Responsibility) deals with competence of personnel with ES&H and safety management responsibilities; as such, this element is relevant to both categories.

ORGANIZATIONS RESPONSIBLE FOR SANDIA NATIONAL LABORATORIES

Headquarters: The cognizant secretarial office is the Office of Defense Programs (DP). The DOE Offices of Environmental Management (EM) and Nuclear Energy, Science and Technology (NE) also have significant program management responsibilities and interests in the areas of environmental restoration and reactor facilities, respectively. DP, NE, EM, the Office of Energy Research, and the Office of Nonproliferation and National Security provide about 90 percent of DOE programmatic funding for Sandia National Laboratories (SNL).

Albuquerque Operations Office (AL): AL manages activities at SNL, as well as a number of other DP sites (e.g., Los Alamos National Laboratory, the Pantex Plant, and the Kansas City Plant). AL is located in Albuquerque, New Mexico, and has area offices at its major sites to provide a continuous onsite presence and day-to-day direction to contractors. Some ES&H support functions are performed by AL personnel in Albuquerque, while other ES&H functions have been delegated to the area offices.

Kirtland Area Office (KAO): AL's area office at SNL, KAO, provides day-to-day safety management direction at SNL, with support from AL. KAO consists of about 50 personnel, about 32 of whom have significant ES&H-related responsibilities.

Lockheed Martin Corporation/Sandia Corporation: The prime contractor for SNL is Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, which has operated SNL since 1993. Lockheed Martin also operates a number of other DOE sites, such as the Y-12 Plant in Oak Ridge, Tennessee, and performs various environmental cleanup projects for DOE. As a national laboratory, SNL facilities and equipment are owned by the U.S. government and operated by contractor employees under a contract between DOE and the Sandia Corporation.

Subcontractors: SNL uses a number of subcontractors, including subcontractors who are involved in construction, maintenance, waste management, and environmental restoration activities.

Note: As used in this report, "Sandia Corporation" and "Lockheed Martin Corporation" refer to the corporate entity that has the contract to operate SNL on behalf of DOE and its parent organization respectively. When used to refer to an organization, "SNL" refers to the contractor employees who are directly involved in operating SNL. "SNL" is also used to refer to the facilities and property that constitute the laboratory.

OVERVIEW OF SANDIA NATIONAL LABORATORIES (SNL)

SNL Mission Statement: As a DOE national laboratory, SNL works in partnership with universities and industry to enhance the security, prosperity, and well-being of the nation. SNL provides scientific and engineering solutions to meet national needs in nuclear weapons and related defense systems, energy security, and environmental integrity, and to address emerging national challenges for both government and industry.

Activities: SNL designs non-nuclear components of the nation's nuclear weapons and performs a variety of activities in support of the nuclear weapons stockpile stewardship, such as component testing and production of neutron tubes and generators for nuclear weapons. SNL also performs research and development projects in a wide variety of areas, such as advanced manufacturing, space programs, information systems, transportation systems, and health care. In addition, SNL has a number of ongoing major environmental restoration projects and a program to manage radioactive and mixed wastes. SNL has recently begun to modify its Annular Core Research Reactor for the production of molybdenum-99—a highly-perishable isotope (half-life of 67 hours) that is widely used in medical diagnosis and treatment.

Location: The largest SNL site, SNL-New Mexico, is located on the Kirtland Air Force Base, which is in Albuquerque, New Mexico, at the foot of the Manzano Mountains. DOE owns 2800 acres and controls another 15,000 acres under an agreement with the Air Force. SNL also has a site in Livermore, California, and various smaller sites, which were not reviewed in this evaluation.

Staffing And Budget: About 10,500 contractor and subcontractor personnel are employed by SNL and its subcontractors. SNL has about 7000 full-time employees, 600 part-time employees, and 1500 subcontractors at the New Mexico site. Another 1200 are located at SNL's complex in Livermore, California. Annual funding for SNL is about \$1.2 billion, which includes funding for both major sites. Approximately 20 percent of the budget is funded by non-DOE sources.

Major Facilities: Major SNL facilities include the Microelectronics Development Laboratory, which is used for developing and engineering advanced electronics; Buildings 805/806/807, which are used for a variety of experiments in chemistry and related fields; the Annular Core Research Reactor, which is a pool-type reactor used for research that is being modified to support the molybdenum-99 isotope production project; the Gamma Irradiation Facility, which contains about 100,000 curies of cobalt-60; the Radioactive and Mixed Waste Management Facility, which is used for sorting, characterizing, packing, and shipping wastes; the Neutron Generator Facility, which fabricates prototype and war reserve neutron tubes, switch tubes, and generators for nuclear weapons; the Hot Cell Facility, which is used for various research and development activities involving highly radioactive materials; two Sandia Pulse Reactors, which are fast-burst reactors used primarily for experiments involving exposing items to the fast-neutron spectrum; storage areas for nuclear materials; three accelerator facilities, which are used for nuclear physics studies and experiments involving radiation effects on materials; and numerous buildings, experimental facilities, and areas used for research, development, and testing in many scientific disciplines, such as renewable energy, security hardware, material science, electromagnetic effects, and various other fields.

Hazards: The most significant potential sources of radioactivity include the Annular Core Research Reactor, the irradiation facility, the three accelerators, the Sandia Pulse Reactors, nuclear materials in storage, and radioactive and mixed wastes. Chemical and biological hazards include a wide variety of toxic materials used in experiments and research, oils contaminated with polychlorinated biphenyls, acids, caustic materials, and various chemicals and solvents used in laboratories and maintaining facilities and equipment. Construction, decontamination and decommissioning activities, and work in areas with chemical processes, high voltage, heavy equipment, high energy steam, rotating machinery, magnetic sources, and cryogenic processes also present potential hazards.